Semiotics in Action: The Pragmatic Level

"Contemporary ways and structures on the pragmatic level of semiotic" was the title suggested by Prof. Herbert Stachowiak, the initiator and editor of the series. I understood it as an invitation to account for contemporary significant directions (a task of the yet not written history of contemporary semiotics) and to show the methodological elements characteristic of these diverse tendencies. While I do not shy away from these expectations, I have to acknowledge that the main purpose of this study is to put in perspective the contemporary ways and structures on the pragmatic level of semiotic. Privileged to account for such developments, I also take it as an implicit mission to challenge some of the ways the pragmatic level has been understood and applied, as well as the structures within which this has come about. One of the intentions is to reintegrate what became known, after Morris et al., as the pragmatic level of semiotics and to remove it from psychology (where it landed again despite Peirce’s initial warning), and to place it back in the semiotic from whence it originated, in order to realign it with the foundational Peircian philosophy from which it derived and outside of which it makes little sense, if any. To a certain extent, my previous contribution Pragmatics in the Semiotic Frame (Nadin, 1987) can be seen as the foundation for the views expressed here. It is not for the sake of quoting myself—a form of self-indulgence widespread in academia—that I will refer to this text, but for avoiding unnecessary repetition.

The plan I intend to pursue is straightforward: to define the semiotic frame (“Premise”) within which a sensible, and hopefully coherent, discussion of the pragmatic level is possible, and which is also broad enough to make possible explanations of directions for future developments. Then, for various reasons, I have decided to approach the horizontal horizon of the definitions and only some structural approaches to the subject and only particular signs used in mathematics and logic), colors, shapes, and musical tones occurring in our technical or artistic activity are determined by the nature of our own existence, by the coherence which we project upon experiences in which we involve ourselves or which we design, trigger, and analyze. Sometimes the balance is inclined towards the physicality of signs, other times towards the mental aspects. In recent years, ways in which we can identify beforehand as the behaviorist pragmatic and the mentalist and functional views. (These accounts are offered in the sections “Journey In and Around the Semiosphere,” “On the Reality of the Mind,” and “Sign and Memory.”) The well-versed reader might wonder whether these directions are not too close to the way we account today for philosophy and its contemporary ways. The fundamental philosophical attitudes that my account takes into consideration are reflected in semiotics, because semiotics requires a philosophic foundation even if it does not always use philosophic discourse.

In view of the implications semiotics has in current cognitive studies and their artificial intelligence technological embodiments, I will continue (“The Inference Engine”) by introducing the idea of a semiotic stage of human development that corresponds to the post-industrial society of a new horizon of the debate between those accepting only the singulars and rejecting the reality of generals, and “parties” involved. This may sound strange to some contemporary readers, especially those who could not come to understand that the modern world is not divided in the same way as ancient society was, into several “classes” of humans but into “parties” involved in the same dispute. Sometimes the balance is inclined towards the physicality of signs, other times towards the mental aspects. In recent years, ways in which we can identify beforehand as the behaviorist pragmatic and the mentalist and functional views. (These accounts are offered in the sections “Journey In and Around the Semiosphere,” “On the Reality of the Mind,” and “Sign and Memory.”) The well-versed reader might wonder whether these directions are not too close to the way we account today for philosophy and its contemporary ways. The fundamental philosophical attitudes that my account takes into consideration are reflected in semiotics, because semiotics requires a philosophic foundation even if it does not always use philosophic discourse.

The premise of my research on contemporary pragmatics defined in a semiotic framework is that semiotics can be loosely characterized as a way of revealing how our knowledge of the world (both physical and spiritual) is constituted, and how our awareness of the process is reflected in the dynamics of various semiotic systems or directions. More strictly, as the “quasi necessary or formal doctrine of signs,” (CP 3.271, 1931-1958) it deals with what became known as modes of rational conduct. Noth’s (1985) definition seems to reflect our better understanding of the role this discipline can assume today: “Semiotic is the science of signs.” In practice, I have found this formula vulnerable, if not vacuous. Locke, in 1690, translated the medieval expression, doctrina signorum, which, in the parlance of the Schoolmen, as well as of Locke and later of Peirce, acknowledged that the true burden of semiotics is to ascertain the means whereby knowledge is acquired, increased, and passed on (“communicated”). In brief, semiotics is an evolving theory of mind, which, since the late 1950’s, has been re-described and declared to be the subject matter of the newly labeled “cognitive sciences.” It is also useful to think of semiotics as a teaching maneuver combined with a learning strategy (Sebeok, 1986).

Reasoning (today mimicked in various computational models, some originating, ironically, from previous attempts to build mechanical contraptions conceived for performing logical or arithmetic operations) is in signs and through signs. Without an adequate sign definition, this rather strong statement means nothing. With confused or arbitrary definitions (useful in many cases), it can turn into a rather misleading and untenable statement. However, in order to find out what kind of a sign concept would justify the semiotic approach, we must, submit, question again and again the very foundation of a sign-oriented discipline and come to realize that this foundation is itself pragmatic. Looking at the process of reasoning in reverse, i.e., back from results that we share either as scientific principles or philosophic truisms, to the process through which they were attained—and which semiotics call semics—we should understand that our hypotheses are continuously tested. We are part of the sui generis experiment through which semiotics itself has repeatedly come into being during the history of human thinking. It vanished again and again, because the promises made, at junctures such as Aristotle, St. Augustine, Locke, Giordano Bruno, Leibniz, Baumgarten, Poinsopt, etc., went far beyond the actual knowledge it rendered possible or the explanations semioticians (bona fide or self-declared) thought they could deliver.

The facts of semiotics are testimonies of experience, not experience as such. These testimonies are signs and their most immediate function is to represent. Some representations are communicated (in forms such as theories, explanations, hypotheses, proofs, etc.). Some are perfected until they reach a level of expression which justifies them in themselves (works of art, games, formalisms, etc.). At first impression, signs appear to be subjective, random, and arbitrary. Many of those who have tried their luck in semiotics (Pelc talked about the "waves of immigrants" flooding a science in periods of its prosperity, "attracted by prospects of new possibilities," 1984) have never realized that signs are not really arbitrary. Some self-proclaimed semioticians and some "immigrant" semioticians are like people who fail to understand that numbers or, more generally, mathematical notations are not at all arbitrary, that colors, shapes, and musical tones are not arbitrary, that languages are not arbitrary. Signs (in particular signs used in mathematics and logic), colors, tones, and shapes occurring in our technical or artistic activity are determined by the nature of our own existence, by the coherence which we project upon experiences in which we involve ourselves or which we design, trigger, and analyze.

There is a physical reality to any sign (accepted without exception in every know semiotics), and there is a mental process associated to it. Sometimes the balance is inclined towards the physicality of signs, other times towards the mental aspects. In recent years, ways in which we can identify beforehand as the behaviorist pragmatic and the mentalist and functional views. (These accounts are offered in the sections “Journey In and Around the Semiosphere,” “On the Reality of the Mind,” and “Sign and Memory.”) The well-versed reader might wonder whether these directions are not too close to the way we account today for philosophy and its contemporary ways. The fundamental philosophical attitudes that my account takes into consideration are reflected in semiotics, because semiotics requires a philosophic foundation even if it does not always use philosophic discourse.

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2. Journey in and around the semiosphere

Max Fisch (1969) said, "There have been many revolts against Descartes." Pragmatism, as an intrinsic part of Peirce's semiotics, can probably be called one of the most radical of these never-ending attacks on one of the most conspicuous constitutive elements of what is called western civilization. From a certain vantage point, these revolts can be seen as the continuation of the debate between nominalism and realism. By an ironic twist, which makes the object of this section (and which did not go unnoticed for too long, see Notes, 1), the basic position expressed in Peirce's sign theory and in the doctrine of pragmati(ci)sm was reversed in Charles Morris' (1938) division of syntaxics, semantics, and pragmatics. For a number of reasons, this upside down pragmatism dominated the modern new beginning of semiotics and has exercised a strong influence even in our days.

The spiritual journey of what is known as logical positivism (and all its future directions and denominations) remains connected to some of the places where ideas were formulated, developed and results published and argued. In the move from some of the German-speaking Middle Europe (Vienna is definitely a station of renown, so is Prague, where in addition to local scholars, the Russian formalists congregated for a while and established a rather important semiotic center) to England, and finally to the American continent, the group exercised an impressive, though not always consistent, intellectual influence. The idea of a Unified Science, Einheitswissenschaft, and even Universal Science, for which semiotics can serve as an instrument (or be that universal science) determined others in addition to Morris and Camp to research them and, in a way, defined them. Lotman and Uspenskij, and the authors of this book, dig this development, as Descartes did at his time, for fundamental concepts, elementary experiences, and the possibility of applying constructive principles within gnoseology and epistemology. When Morris took over Peirce's semiotic (especially the pragmatic concepts, in a strange selective manner and never really correctly), he must have hoped that the realistic foundation could simply be ignored, or he read only that part of Peirce's work which was still of nominalist extraction. Although we know what was already published from Peirce's studies in the years when Morris wrote his compilations, we cannot be sure that Morris read everything, or that he was able to make up from fragments (constituting the Collected Papers edited by Weiss and Hartshorne) the image of a comprehensive philosophical system. We can say, however, that changes made when he took over a terminology, which was not his and for which he did not credit anybody, are characteristic of a nominalist.

After all, aren't these concepts only names (Notes, 2)? We know now that names participate in knowledge, too, and that by no accident Peirce worked on Ethics of terminology (Notes, 3) exactly after realizing the role it plays in our attempt to build theories or to explain concepts. Transforming the interpretant into an interpreter—a change critical for the very thought of pragmatism—redefines semiosis, redefines the icon, index, symbol, etc., are exercises in composition but implicit philosophic arguments, too often unnoticed. This is because the sign systems are simple structures. Semiotic practitioners only need to focus on the following sequence: Names mean nothing, only the individual is important, so pragmatism is actually what people ("interpreter") do with signs. Peirce's obsession with defending his definition (at the price of coining another term) and maintaining the fundamental philosophic attitude of a nominalist converted to scholastic realism was not an issue for Morris. With Morris and his followers, pragmatism became a form of behaviorism with a strong logical-positivist tone.

These preliminary remarks are necessary because one of the dominant ways the pragmatic level of semiotics was and is realized is behavioristic. The mystification is not unimportant. Peirce almost prophetically wrote about the implications. We cannot begin with complete doubt. We must begin with all the prejudices which we actually have when we enter upon the study of philosophy. These prejudices are not to be dispelled by a maxim, for they are things which it does not occur to us can be questioned. Hence this initial skepticism will be mere self-deception, and not real doubt; and no one who follows the Cartesian method will ever be satisfied until he has formally recovered all those beliefs which in form he has given up [...] A person may, it is true, in the course of his studies, find reason to doubt what he began by believing; but in that case he doubts because he has a positive reason for it, and not on account of the Cartesian maxim. Let us not pretend to doubt in philosophy what we do not doubt in our hearts" (CP, 5.265, 1, 1931-58).

Now let us examine how this particular kind of pragmatic concept is applied. From among the many impressive scholarly formations in which the behaviorist pragmatic thought is pursued, the one represented by what is known as the Soviet School deserves special attention since it is symptomatic for the entire direction here analyzed. It also deserves attention due to the significance of the work produced and the influence it exercised (not only in the sphere of influence of the country from which it originates and in which it plays a rather important intellectual, and not only intellectual, role).

The distinction between the semiotics of the sign and the semiotics of language as a sign system serves as initial identifier for Yuri Lotman and Boris Uspenskij (1984) in their effort to introduce a comprehensive semiotic concept and to apply to in the analysis of such complex phenomena as those belonging to and defining culture. Although the references the two give in the course of the argument (Notes, 4) are stricto sensu waning, the thought concerns close examination as we have already learned from Lotman (Notes, 5), there is a pragmatic dimension in reconstructing extratextual empirical reality by means of the text. Now he and Uspenskij develop the idea by saying that culture can be seen as a "system that stands between man (as a social unit) and the reality surrounding him, that is, as a mechanism for processing and organizing the information which comes to him from the outside world." The next step is defining a comprehensive semiotic entity follows almost syllogistically, "Just as life on earth forms a biosphere, the system of interdependent dynamic life-structures, so the semiotic phenomena come into the researcher's view not as separate isolated phenomena, but forming a vast picture of a single semiosphere," (Lotman & Uspenskij, 1984).

Jonathan Culler (Notes, 6) expounded a similar idea, mentioning that Cassirer, Whitehead, and Langer asserted the primacy of what they called the symbolic dimension of human experience.

Several remarks about this concept are necessary before we continue the analysis; but in order to make them, we have first to figure out what the semiosphere actually contains. "The semiosphere, if pictured in the momentary film-still of a synchronic cross section would include in itself all the totality of semiotic acts, from the signals of animals to the verses of poets and the call-signs of artificial satellites," Lotman & Uspenskij, 1984). It is quite clear that Lotman and Uspenskij continue Morris' line of thought, suggesting a typical stimulus-reaction model (identified even in the premise represented by the integration of signals of animals in the category of semiotic acts). The nominalist foundation derives from the very strong referential quality of the semiotic universe described, as well as from the psychological overtones reflected in the type of pragmatic possible within the semiosis. The authors, and almost all their colleagues in the school of thought they belong to, candidly make known the premise of the pragmatic function relevant to the semiosis and talk about culture as a semiotic system which "regulates human behavior" and also "determines how he (man) models the world," (Lotman & Uspenskij, 1984). It is a sophisticated approach within which the authors try to integrate the pragmatic function relevant to the semiosphere and talk about culture as a semiotic system which "regulates human behavior" and also "determines how he (man) models the world," (Lotman & Uspenskij, 1984). It is quite clear that Lotman and Uspenskij continue Morris' line of thought, suggesting a typical stimulus-reaction model (identified even in the premise represented by the integration of signals of animals in the category of semiotic acts). The nominalist foundation derives from the very strong referential quality of the semiotic universe described, as well as from the psychological overtones reflected in the type of pragmatic possible within the semiosis. The authors, and almost all their colleagues in the school of thought they belong to, candidly make known the premise of the pragmatic function relevant to the semiosis and talk about culture as a semiotic system which "regulates human behavior" and also "determines how he (man) models the world," (Lotman & Uspenskij, 1984). It is a sophisticated approach within which the authors try to integrate the pragmatic function relevant to the semiosphere and talk about culture as a semiotic system which "regulates human behavior" and also "determines how he (man) models the world," (Lotman & Uspenskij, 1984). It is a sophisticated approach within which the authors try to integrate the pragmatic function relevant to the semiosphere and talk about culture as a semiotic system which "regulates human behavior" and also "determines how he (man) models the world," (Lotman & Uspenskij, 1984).

It is worth mentioning that almost all the Soviet semiotics (in which case the names Eisenstein, Ivanov, Bachtin, etc. should be added to those of Lotman and Uspenskij) devoted attention to culture in its various forms and produced some of the most intriguing cultural essays of our time, especially after the philosophical discussion of the distinction between culture and civilization ended so inconclusively in the writings of Spengler and his followers. The effort to apply a sign oriented method did not succeed without difficulty, since the ideological aspects of the method of research was quite often disqualified anything which did not follow the prescription of the dialectic and historic materialism (itself a basically nominalist philosophy). Culler describes quite accurately the limits within which semiotic work can be performed under these circumstances: "..."
Marxist might see his task as interpreting social phenomena as signs of the events of economic history which caused them." (Notes, 7).

The pragmatics, as we read it here, coming from a very rigidly prescribed philosophical universe, is quite impressive. The vocabulary used can be misleading; it is a language game of sorts in a regulated environment in which the semiosis cannot really be infinite. (Actually, it is not infinite, primarily because of the behaviorist premise that reduces the sign to a stimulus function, and the reaction to a limited "effect." Within the culture which semioticians brilliantly analyzed, the use of semiotics was interpreted by many as an act of intellectual resistance. The observer and the observed phenomena constitute a unity in view of the meaning of the endeavor (Notes, 8). Semiotics explains past pragmatic relations in order to understand different pragmatic aspects. By no accident, some of the most intriguing contemporary works in semiotics and the pragmatic implications of pragmatic action for a long time came from the Soviet Union, from East Germany, Poland, Hungary and similar behavioristic political impact of Western Marxism. Other, they belong to a very rigid system of signs, as the trajectory which identifies the entire corpus of works to which I refer is its almost never challenged behavioristic tone. The utopian, (in many people's minds) Marxist project of a new human subject involves a strong behavioristic component, present not only in semiotics, but also in psychology, philosophy, economics, etc. The teleological nature of this society is reflected in the teleological nature of the pragmatic concept it makes possible (and even requires). Although dialectics is the official method, rhetoric is the real method, an uninterrupted semiosis of persuasion. The world (society, culture, etc.) has been changed. Or the world has to be explained in order to explain historic laws, to suggest ways to implement programs originating from the dominant ideology.

A parenthesis should be opened at this juncture: The utopian Marxist project is now subject to evaluation, criticism, and even an open revision. At the time I started reviewing this text—I August 1989, mentioned here because recent events have shown how fast changes of direction can occur—a significant, and surprising by its amplitude, contemporary direction is embodied in the semiotics of glasnost and the rhetoric of perestroika (both defining pragmatic directions). Related to this are the developments toward plurality (in Poland and Hungary so far), all significant for the departure from the embedded behavioristic dimension of the utopian project now challenged not only theoretically but also in social and political practices. Nevertheless, in the new tendencies (reflected in new policies and new semiotics), one can see behind Morris the shadow of Descartes, to read through the eyes of Marx and Engels by leaders of a more pragmatic tendency and with a historic confidence not shattered by the acknowledged failure of the system they must now abandon. End of parenthesis.

The semiosphere is a system of rules justified through culture. In the French, semiotically inspired, approach, especially in Barthes' work, the same basic attitude helps in defining the ideological implications of different forms of pragmatics within the semiotic systems constituting culture. It is within this school of thought that Freud's psychological analysis penetrated semiotic discourse in order to explain deviations for which more determinist thought cannot exactly account. Freud's and Jung's symbolic systems play a very important role here, stimulating discussions regarding semiotic codes which went a step ahead of the similar discussions in the Soviet School. Eventually the theme will have to be recuperated, brought some way outside this behavioristic frame. To date a substantial deal of interesting semiotic receptions have been produced within this paradigm and constitute hypotheses which deserve to be challenged and tested. The pragmatic of the sign is defined within the semiosphere like in the dialectic model of the relation between structure and economic basis, but generally with much more richness, more details, more nuances. Feruccio Rossi-Landi (Notes, 10) went so far as to define language as a force of production and continued with a type of analytic discourse typical of Marxist political economy.

The entire discussion here is one of brilliant essays, which means it is a semiotic discourse with a pragmatic level situated somehow between the rigorous explanations one would like to receive from a systematic sign approach and rich literary expression. Once the framework is established, demonstrations remarkable in their unexpected ramifications are provided. In his succinct article "On the Origin of Russian Obscenities," Uspenskij (1984) approached the sensitive issue of a "vocabulary of degradation (which) approaches that of religion." (Note 11). The taboo attached to the subject, today as in older times, does not preclude elements of interdisciplinarity: from literary studies, history, and aesthetics, to anthropology. Although at times the reader would hope for a more detailed account (of the opachivanie, nocturnal ceremony, aimed at freeing a village from epidemics, or of why an obscure expression was considered "a Jewish word"), the pragmatics evidenced through the text is impressive in its variety of implications. This and a few other articles are instances in which the limits of the behaviorist premise become painfully evident. Other times, the authors operate within the boundaries they set for themselves (an excellent example is Lotman's "The Stage and Painting Code Mechanisms for Cultural Behavior in the Early Nineteenth Century," (Notes, 12). A detailed account of all the themes and results obtained within this pragmatic mode is difficult to give and not very conclusive after all.

Within the semiosphere, to which semiotic action of behaviorist nature belongs, we move from premise to conclusion in ways, which actually contradict the very nature of the pragmatic principle. Signs are reduced to a preseciotic condition (they are after all only signals, some very complex, but designed to function as signals). There is actually no way for a semiotic process (potentially infinite by definition) to take place. All processes are psychological, but against the background of some broader picture, sometimes so broad (the entire culture) that one wonders what it actually means to work within such a broad context as an entire culture. In such cases even the nominalist foundation comes under the pressure of a speculative tendency. These statements should not be misconstrued as a value judgment, but viewed in the frame of a discussion started before and outside this study with the question "Which pragmatism?" and continued with "Why pragmatism?" If the spirit of the method cannot be observed. It is quite surprising to find Descartes' subjectivism, criticized with such fervor by Morris' teachers, revitalized within the boundaries of an approach faithful to the "bible" of objective materialism. The logical contradiction originates in Morris' concept of pragmatism, and it marks the research I refer to in ways probably not anticipated by those who embraced his concept.

The semiosphere, with its memory, includes all the texts ever created, as well as the programs for generating future texts. Articulation of value judgments within this sphere is cumbersome. The unity, almost identity, between the evaluated and the evaluator is an almost insurmountable hindrance. So it becomes necessary to escape, to try a journey around this metaphoric space of semiotic action, or to find a third element which will allow for the sequence of mediations through which the pragmatic level of the sign is achieved. Individual authority, which is the indexical sign of behaviorist systems, has to be replaced with the objectivity of the scientific community, in order to make clarity possible.

The issue is thus the design of the experiment bearing on the truth of a conception: "In short, cognizability (in its widest sense) and being are not merely metaphysically the same, but are synonymous terms," (CP 5.257). Even the ideas displayed in writings like Lotman's, Uspenskij's, Ivanov's, and others and the attempt to reinstatement introspection (cultural, in this case) become disputable. The pragmatic maxim and the logic of abduction that embodies it require continuity of inquiry, testing of hypotheses (implicitly, their testability), and openness. Descartes' system needs an element which will allow for the sequence of mediations through which the pragmatic level of the sign is achieved. Individual authority, which is the indexical sign of behaviorist systems, has to be replaced with the objectivity of the scientific community, in order to make clarity possible.

The restoration of the pragmatic foundation, which is actually taking place in our days within various semiotic schools (Soviet included), involves the need to understand Peirce's conversion to realism and why nominalism, irregardless of its nuances or ideological bias, cannot house a true pragmatic conception. What is even more important for our understanding of what happened at the moment Morris mystified Peirce, and what has happened ever since the attempt to make pragmatism a viable semiotic concept, can be read in Peirce's notes: "Everybody ought to be a
3. On the reality of the mind

Facts of semiotic interest, such as ones we notice in analyzing or practicing representation, communication, and expressive forms, are facts of reality and as such should be understood as facts of experience—a special type of experience. They have a formal nature. Whether semioticians apply formalization or not is here a non-issue. This has already caused enough heated and never settled disputes from which our understanding of pragmatic conditions under which certain interpretations become necessary (see the works of Savan, Marcus, Brainerd, etc.). The validity of the critical discourse (scientific, philosophical, social, aesthetic, etc.). In its more objective directions, such as those applying mathematical descriptions of phenomena interpreted semiotically, and discovering the limitations of semiotic devices, we follow patterns of which we are not entirely aware as when we apply the syntactic rules of our language without knowing what the rules are, and what their justification is. The elements that we are aware of are those commonly associated with culture and proliferated through the prism of the semiotic filter that characterizes a certain cultural context (school, church, pretended truth, etc.). The elements that, through discovery (heuristics), become the object of our awareness change culture. The process involves conflicts and a certain emotional component that affects the pragmatic level. It also involves the act of erasing (on which the entire Deconstructivist school of thought and Derrida's pragmatics rest). Semiotics only explains; there is no such thing as semiotic proof, or even semiotic demonstration. Its method is the argument. It is a processing of raw material in view of extracting some less expected component, precious because it reflects the coherence and integrity (in a broad epistemological sense) of human nature. (To clarify, I mean in order to make silver, which metaphorically pretty much covers the work of a semiotic working on texts, artificial languages, images, medicine, judicial aspects, etc.) The degree of semiotic certainty is represented by the degree of certainty of the rules governing semioses leading to explanations.

Some parts of these rules are immediately accessible to our rationality; others require intellectual and emotional participation in processes extending far beyond our lifetime. Explanations are de-implementation of rules. They result from applying some kind of reverse engineering and have a degree of certainty comparable to that of proofs or demonstrations that semiotic knowledge seems to be about a universe in continuous expansion and diversification. In reality, it projects upon its object an uninterrupted flux of questions and hypotheses, concealing what is apparent, obscuring what became a rule of routine, and bringing to the forefront what is questionable and what requires unprecedented rules in order to be understood and explained.

These remarks are less descriptive than the one used in presenting the behaviorist approach. There are many reasons for this. For one, mentalistic schools of pragmatic intent or method, such as those associated with Bense, Derrida, in part Eco, Savan, etc., are less unitary in their premise intellectual purport. On the other hand, the remarks outlined above are at the same time constitutive for the entire paradigm (one) shared during a certain phase of my work in and outside semiotics. It is interesting how basic research, offering generalizations that rarely branch out into structures of detail—and when they do, tend to get lost in detail (see the plethora of Derrida followers)—remains vulnerable to a criticism that signifies more to the language used than to the substance, i.e., to the apparent syntax of the theory and not to its peculiar pragmatic. Indeed, the basic attitude is philosophic realism, disguised almost pathetically in all sorts of "dressings," and it is quite strange to see how even Marxist semioticians feel comfortable under this scholastic flag (let me mention here Pelc, Nowakowska, Marcus, etc.). The interpretation of the sign, which is the main pragmatic function, actually means the building of meaning as an instance of the sign process (substantiation). Literary and art criticism enthusiastically embraced this particular pragmatic direction, especially in view of the difficulties in ascertaining or proving semiotic intentions in fiction, poetry, drama writing, and the plastic and performing arts. The continuous reconstruction of the sign in the act of its interpretation is very close to the spirit of Peirce's philosophy, but at its extreme, it questions the validity of any critical discourse (scientific, philosophical, social, aesthetic, etc.). In its more objective directions, such as those applying mathematical descriptions of phenomena interpreted semiotically, and discovering the conditions under which certain interpretations become necessary (see the works of Savan, Marcus, Brainerd, etc.), the validity of the critical discourse becomes an issue of coherence. Quite often the horizon of the interpretation of signs as logical mechanisms, especially deductions, is suggested within this type of pragmatic attitude.

Less ideological in its program, more restricted to particular pragmatic situations and affected by the metalanguage used, the mentalistic orientation disappoints through its lack of authentic interdisciplinarity (after ascertaining the need for interdisciplinarity and the role it is supposed to play). In search of the "means and mechanisms by which signs are processed". Floyd Merrell (1982, p. vii) deals with "thought experiments," used throughout "to integrate diverse levels of semiotic processes." He describes how an experience analogous to the creative process leading to the generation of a book is re-created in the reader. In the tradition of an ideal of literacy, Merrell's book suggests the potential "infinity of texts and mental worlds." (Notes, 14). Meining's influence (through his theory of mental objects) on this kind of research cannot be ignored. From him derived, I suppose, all the interest in the absent sign, in the "non-existent" which however exists semiotically in our mind (Notes, 15).

Almost closing this account, Umberto Eco's formulation, "The sign as the locus (constantly interrogated) for the semiotic process constitutes [...] the instrument through which the subject is continuously made and unmade," suggests that we can understand semiotic mentalistic concepts and their specific pragmatics against the background of a sui generis history of humankind. He continues: "The map of semiosis, as developed by the cultural historian, is historical in form but also hermeneutic in character; it is also historical and hermeneutic in the sense that it is a map (as we would now think)," (1984, p. 45). With this particular paradigm, the reflective moment in semiotics is especially important. The self-critical moment, which characterizes each sign process, is relevant to a semiotic conception that proclaims the constitutive nature of signs. As an effect of this moment, pragmatic feedback takes place. Kristeva (1969, p. 30), obviously influenced by Peirce, states: "Semiotics cannot develop except as a critique of semiotics. At every moment in its development, semiotics ought to theorize its own object, its own method, as well as the relationship between them; hence it theorizes itself and becomes, by turning on itself, the theory of its own semiotic praxis..." The normative nature of Kristeva's
assertion might be misleading if the statement is not put in the larger framework of emancipatory expectations. The semiotics considered here is supposed to be practiced with self-consciousness, in awareness of possibilities, critical towards semiotic realities, and in full anticipation of new forms of semiotic practice. From a narrower perspective, her remark suggestively describes phenomena all semioticians encounter when falling prey to terminology (and practicing it as an end in itself), or to some quasi—methodology. Probably the most blatant example, which has produced a number of critical reactions, is the obsession of semioticians with taxonomies. Some believe—and Kristeva correctly suggests a way out of this situation—that all that semiotic discourse is supposed to produce is classifications of signs (and possibly sign processes). The way out is to understand the relevance of criteria for classification, the implicit dynamics of each taxonomy, and the reason why accuracy can sometimes be counterproductive (for instance when it becomes unexpressive, hence insignificant). The excessive analytic spirit leads us to trade in parts for wholes, and if we are not aware that the dissected sign is actually a different reality than the sum of its parts, we shall maintain hopes never to be fulfilled. Once the status of semiotics as self-theory is understood and reflected in our methods, semioticians will hopefully spend less time in establishing new taxonomies and more in applying what we learn from examining classifications produced over time (or even better, those relations on whose basis parts are articulated, constituting whole sign systems with a dynamics almost never captured in our labels). In this vein, it should be noted that Kristeva’s remark suggestively describes phenomena all semioticians encounter.

The need for a better inner structure, for focus, and for recognizing areas of common concern or critical to the development of more appropriate semiotic explanations of significant aspects of science and other forms of human activity is reflected in broader projects (Notes, 16).

The particular semiotic direction discussed above seems to be constructed around two basic assumptions:

1. Explaining semiotics is part of the semiotic action.
2. The results of semiotic action are identifiable to the extent we want to account for them.

The second assumption says that in numerous instances of human praxis, explanations other than semiotic explanations (or no explanation at all) accompany semiotic action. The results might be assigned to different forms of human action (subsets of the encompassing semiotic action) and accounted for either from specialized points of view or from a metaphysical horizon. The willingness to semiotically account for results of semiotic action identifies the need for the semiotic corpus of knowledge.

As an objective artifact, semiotic explanations constitute only frames of mind. In concluding (relatively speaking) the search for the best pragmatic strategy, we will affect the claims on the final result, but not the structure of the semiotic approach. To make sense means to investigate the reality of the sign as identified in the mind and not in whatever happens to be the physical reality of that sign (book, painting, social order, political ceremony, etc.). What Karl Popper once called a “horizon of expectations” (1972, p.49) is, within this model of the sign, a dynamic semiotic matrix. The constitutive energy of conventions (analyzed in works by Todorov, Hirsch, Fish, Keynes, Bloom, etc.) allows the_projection of such a matrix on the mirror that reflects what we put in front of it.

4. Sign and Memory

Recall that we agreed to interpret a sign means to be the sign. This simply goes back to the definition that establishes the epistemological condition of the sign, i.e., its processual nature. While something can stand for something else (“in some respect or capacity,” as Peirce so aptly expressed it), it does not become a sign unless interpreted as a sign. In the act of interpretation, we insert ourselves in the sign relation; that is, we give it “life.” This led to a pragmatic equation: two individuals are similar to the extent that their interpretation of a sign is similar. Let me explain: For two signs to be interpreted in a similar way, they need not have a similar physical appearance (the word, the image, the taste, etc.), but they ought to “function” similarly, i.e., to be pragmatically similar (assuming identity of context). Fractals might be a useful mathematical formalism for describing similarities (especially self-similarities), in which case the dynamic aspects (as captured in the modern theories of chaos) are approached. I made this point elsewhere (Nadin, 1988). Another way to describe this similarity is through the mechanism of mathematical (or logical) machines, in which case the deterministics aspects are made evident.

What we want to do is to consider the morphology of mental predicate-predicate in a sign system, independent of the physical world in which this morphism program drives the theoretic machine (semiotics) whose functioning is representative of its pragmatics. Functions and relations in the physical world can be specified, and once specified, they can be hard-wired to support the transition from mind to the sign system considered. Quite early in my work (1977), I showed that an appropriate semiotic system capable of handling these morphisms is represented by machines describing formal languages, in particular computers (in which case the programs are the descriptions). The treatment of the sign in terms defined in fuzzy set theory corresponds to its nature as defined in the foundations of semiotics. As a reality, signs participate in semiotic processes by virtue of affecting other signs: "No sign can function as such . . . it is absolutely essential to a sign that it should affect another sign," (CP 8.225).

Explaining in which respect Peirce already used fuzzy terminology, I showed (Nadin, 1980, p. 351 ff.) that synecdoche, "that tendency of philosophical thought which insists upon the idea of continuity as of prime importance in philosophy," (CP 6.169) is the core characteristic of this anticipation of the need to capture vagueness in sign systems. Continuity is regained in the fuzzy set concept as introduced by Zadeh (1965) and accounts for what Peirce considered a basic pragmatic requirement: "Continuity govern the whole domain of experience in every element of it," (CP 7.566). For a while Peirce confronted, almost like we have to do today, the problem of the representation of continuum through discrete signs. (We do it using the digital system.) He introduced the concept of potential collection (6.187), "indeterminate, yet capable of determination" (6.185), as well as the concept of vague: "It is vague, but yet with such a vagueness as permits of its accurate determination in regard to any particular object proposed for examination" (6.186).

In order to undertake the last step towards the analogy sign definition and the definition of a fuzzy automaton, we should keep in mind that the sign proper is a self-adjusting system, based on the feedback characteristic of sign processes. This is expressed in terms quite different from those used by Wiener in his foundational work in cybernetics, but unmistakably the spirit is the same: "The object of representation can be nothing but a representation of which the first interpretation is the interpretant [...] So there is an infinite regression here. Finally, the interpretant is nothing but another representation to which the torch of truth is handled along: and as a representation, it has its interpretant again. So, another infinite series" (1.338).

The definition of the sign: S=S(M,O,I,o,i) formalized and commented by Max Bense (Notes, 17) has an obvious, at least formal, analogy to the definition of an abstract automaton (Mealy, 1955) given through a quintuple in the general form

\[ A = (X, Y, O, \delta, \lambda) \]
\[ X = \text{finite set of inputs} \]
\[ Y = \text{finite set of outputs} \]
\[ Q = \text{finite set of states} \]
\[ \delta = Q \times X \rightarrow Q \text{ next state function or transition function} \]
\[ \lambda = Q \times X \rightarrow Y \text{ next output function or output function} \]

Extending the analogy from abstract automata to abstract fuzzy automata followed an analysis of the sign definition and its pragmatic ramifications. Since some of the arguments are directly related to the topic developed here, it makes sense to restate them in an abbreviated form. Repertory relations (pertinent to the syntactic level of the sign), which can be represented by means of set theory, are fuzzy by definition in the sense that the characteristics of representamens can be more or less qualitative, singular, or have the appearance of some law (these characteristics are captured in the notions of Quali-, Sin-, and Legi-signs). Object relations, which describe the representation function of the sign,
are quite adequately captured in terms of category theory, in particular by extending the concept of morphism to fuzzy morphism and redefining categories as fuzzy. A sign being a system of states, i.e. of possibilities of realization, determined by the object for which the sign stands, the "cognition produced in the mind," (CP 1.370) can be seen as the output of the mathematical machine describing the sign.

Given an automaton M, minimizing the number of its states, which means minimizing the constitutive repertory, means finding another automaton so that M' ≅ M, for which the number of states is minimal (minimum repertory supporting the embodiment of a desired interpretation). This is a very restrictive condition, fulfilled probably only by the system of language with its 26 to 28 letters (in all fairness, one should add diacritical signs and the ten digits). The problem raised can be solved using various algorithms.

A fuzzy abstract automaton (Moore type, cf. Negoita & Ralescu, 1975) can be represented by a quintuple in which the set of inputs (X), of outputs (Y), and of states (Q) are finite. The functions representing the dynamics and the output map, called δ and λ, are fuzzy relations, which means that they can be define

δ: X x Q x Q → [0,1];
λ: Q x Y → [0,1];

If the initial state is represented by q₀ ∈ Q (a representamen chosen from a given repertory of signs), the fuzziness of the system considered is due to its specific functions, which is tantamount to saying that it results from the pragmatics in which the sign participates. The initial state of the semiotic machine can be described as a fuzzy subset of Q. In this case, this initial state is a fuzzy vector

P₀ = {q₁, q₂,..., qₙ}.

In the above relation, i ∈ [0,1] is the degree of membership of the state xᵢ ∈ X at the fuzzy initial state. The standard example for this case is the closed repertory in visual poetry, i.e. the relations established once the convention of iconicity is introduced. Concrete poetry is characterized by the attempt to visualize the subject of the poem. It is a form of visual poetry based on analogies and the mechanism of subtext. Appolinaire, among others, created quite a number of such "poems," lyrical expressions in which the means of representation are visual analogies. The convention of iconicity (i.e., resemblance; he uses words in order to write with them not lines of poetry, but the contour of whatever he wants to represent) requires that the signs used (in this case, words and shapes reminding of the object recalled) preserve their resemblance to what they are supposed to represent. The repertory is only a subset of the repertory of words, limited by the very rule that the artist/poet decided to pursue.

The dynamics δ can be viewed as a family of fuzzy matrices over [0,1]. For qᵢ, qⱼ ∈ X, we shall denote δ(qᵢ, qⱼ) = δ(qᵢ, qⱼ) and thus x ∈ X ⊆ Tₓ ⊆ FM(x); Tₓ = {δ(qᵢ, qⱼ)(x)}.

Let us observe that a fuzzy matrix FM—or matrix over [0,1] (an ordered semi-ring)—is a function (Zadeh, 1968) A : {1,2,...m} x (1,2,...n) → Q; or, M=(mᵢⱼ) is called an FM if 0 ≤ mᵢⱼ ≤ 1.

Usually, the functions δ and λ are given through FM. So, if at the moment t the input is xᵢ, then

Tᵢ⁽ᵗ⁾x₁ = (δᵢ⁾⁽ᵗ⁾(xᵢ) and δ⁽⁺ᵗ⁾ᵢⱼ = δᵢⱼ(t) = δ(xᵢ, qᵢ, qⱼ) = (k(t)).

λ⁽⁺ᵗ⁾ᵢⱼ = λ(q(t))

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All events that can be represented in Mealy's type of finite automata are regular events (Marcus, 1964). The same holds true for events represented by fuzzy automata. Semiotic processes are regular. A sign's derivation from another sign, which is expressed by the functioning of the fuzzy automata, is not only a generative process, but also explains the structure of the process and has an explanation function resulting from its analytical opening. A finite automaton is the type most particular to a Turing machine. The fuzzy Turing machine (FTM) has the condition of an algorithm and not of a sign. It is also defined through a quintuple analogous to that of a sign F = {A, B, X, δ, λ} in which

A = printing alphabet
B = auxiliary alphabet (special symbols)
X = set of internal states
δ: X x U x X x X → [0,1] the transition function
i: X → [0,1] the fuzzy initial state and
U = A ⊆ B; V = U + (-1,0), in which +1, 1, 0 represent the possible moves to the right, left, or the procedure's end, respectively.

The behavior of a FTM is analogous to that of a FM and suggests the analogy between sign processes and learning processes.

We can benefit from the definition remembering that Turing machines (TM) are distributed between TM free of any restriction and TM as finite automata. The weakest condition that can be imposed upon a grammar is to include it in the class of TM free of any restriction. The most restrictive is to be a Markov source, i.e., a finite automaton or, more precisely, a fuzzy finite abstract automaton (FFAA), a condition that we saw that the sign fulfills. Within the frame of scholastic realism, Peirce considered that "the highest grade of reality is only reached by signs," (CP 8.327). Thus the functioning of the FFAA becomes the testbed for the pragmatics of the sign as a theoretic device participating in the semioses through which our ideas gain clarity. The inferential character of the analogy suggested above accommodates quite well the spirit in which Peirce stated "every state of consciousness is an inference, so that life is but a sentence or a train of thought," (CP 7.583). The pragmatic implications of the inferential nature of sign processes will be shortly considered in greater detail. At that time, it will also become obvious that Peirce's sign definition has to be improved in order to accommodate cognitive functions of the mind which, although intrinsic to the semiotic
concept he developed, he did not finally take into consideration.

Having the nature of a universal, signs can be evaluated only through their effects. Hence, the pragmatics of signs is a semiotic issue best represented by the infinity of semiotics as instances of explanation and as participatory elements in proofs or demonstrations. It involves the human being as observer at each time we compare or explain signs, we compare and explain the human being...as though [the sign] is a species of symbol, the general answer to the question 'what is man?' is that he is a symbol. To find a more specific answer we should compare man with some other symbol," (CP 7.583). And this comparison is, of course, the pragmatics of the sign. As opposed to the nominalist constitution of a pragmatic level of semiotics, the realistic constitution has the pragmatic level as its foundation (it is its first category), deriving each other level from it. It is the pragmatic level that results from the semiotic activities and becomes manifest to the manner by which a sign, a very important idea in view of the future work that Peirce will accomplish in establishing the Pragmatic Maxim.

This observation is of extreme practical importance. It explains why until now, starting with syntax and building up the next level, we have almost never succeeded in attaining a desired pragmatic level, neither in designing artificial languages nor in more elaborate applications such as instruction, education, politics, advertisement, etc. For as long as signs are considered and used as behavioral signals, the syntax is indeed the place to start with. But once we understand the broader implications of semiotic action, we will be able to overcome the limitations of this cause and effect model and to start thinking according to the premise of mediation implicit in the sign definition and characteristic of the pragmatic level of semiotics.

Peirce defined three fields of the interpretant: immediate ("The Quality of the Impression that a sign is fit to produce"); dynamic (whatever interpretation any mind actually makes of a sign); final (defined by a negation, it "does not consist in the way in which any mind does act but in the way in which every mind would act," CP 8.314, 8.315). These correspond to the degree to which a sign will be interpreted in a Rhematic, Dicent or Argument manner. In a different context, an example of applying the FFAA description to a specific case (interpreting colors from a semiotic perspective) was given (Nadin, 1977, pp.23-25). This example, as well as others (Zadeh's analysis of the identifier young or bold, my attempt to define value concepts, such as good, expressive, etc.) proves that the analogy between sign processes and the functioning of the fuzzy abstract automaton (descriptions of the sign process) allows us to better understand such characteristics of the pragmatic level of semiotics as processuality, continuity, distinction, and incompleteness. The triadic sign relations have a fuzzy implicit nature. This is quite obvious in the way the signification of language—language as a series of signs—and the interpretation of fuzzy sets—semantic relations—generated by fuzzy logic—can be determined in a certain extent by fuzzy grammars constitute a reality that accounts for the fuzzy character of our thinking and the fuzzy nature of our concepts. The transition from signs of higher semioticity (defined by Max Bense, 1971, as bewußtseinunmittelbarer, i.e., conscious-immediate,) to lower semioticity (weltunmittelbarer, i.e., world-immediate) is also captured in the FFAA description, especially if we approach the minimization of the automaton. The concept of signs—"sign, thing signified, cognition produced in the mind"—are continuously reproduced in the functioning of the sign. Peirce's rather strict triadic-trichotomic model is the conceptual attempt at the minimization of the sign "machine." At the other extreme, we have the practice of "maximization" corresponding to the pragmatics of ambiguity, characteristic of such semiotic activities as poetry, fiction, art, and, to a certain degree, philosophy (not to mention the pragmatics of political or ideological discourse).

Noticing now that any digital computer is equivalent to a Turing machine, we are aware of the fact that mental predicates can be "reduced" to fuzzy Turing machine predicates, more precisely, to such descriptions. Functionalism in its barebones form acknowledges correspondences such as hardware-software brain-mind (or the like) and extends the analogy discussion even to the memory aspect, where some arguments simply refuse to hold water. The discussion is much too elaborate to be even summarized here, but one basic observation will help clarify the issue. We do not remember things: we remember their representations, i.e., signs; we remember states of the "semiotic machine." These states are pragmatic instances of the semiotic activity. So the problem is: How are signs both storage (for whatever is memorized, say a poem, or the density of a new idea) and the sequence of the mind's representation? Connectionists then have the practice of "maximization" corresponding to the pragmatics of ambiguity, characteristic of such semiotic activities as poetry, fiction, art, and, to a certain degree, philosophy (not to mention the pragmatics of political or ideological discourse).

Pragmaticism addresses the community of interpretation (a term coming from Royce, as far as I know). Storing and recalling are intimately connected, and I have sound reasons for believing that this excess memory storage required in computers is a consequence of applying the wrong strategy because our understanding of the cognitive aspects of memory, i.e., the semiotics of memory, is so superficial. We prefer to increase storage capacity (cheaper and cheaper) instead of looking for an improved understanding of the problem. Moreover, each time a new computer, more powerful and with more storage, is made available, we seem to need only a week or so before using it to its limits.

Obviously, semiotics cannot be blamed for this, but since it integrated cognitive aspects in its domain, it would not be out of place to ask how much of what we have learned from explaining the semiotic functioning of the human being can be used in the design of better machines, and, moreover, how. In recent years, Fodor, Eco, Dennet, and quite a few others have expressed interest in the subject and started exploring it. This interest is of a pragmatic nature. Eco (1985, p. 9), addressing a conference on pragmatics suggested that "We should conceive of two different pragmatic approaches: there is a pragmatics of signification (how to represent in a semantic system pragmatic phenomena) and a pragmatics of communication (how to analyze pragmatic phenomena that take place in the course of a communicative process)." He goes on to develop a suggestion from Bar-Hillel (1970) concerning pragmatism, and deals with the very important subject of background knowledge. In concert with others (Notes, 18), he goes on to say that "researchers in Artificial Intelligence have convincingly demonstrated that there are certain standard frames, scripts or goals that can be recorded as a part of the average competence of a social group," (Eco, 1985, p. 16). Knowing why Eco does not deny the fact that this view—his semiotics is one of Encyclopedia, along the line of Leibniz fascinating project of a general doctrine of signs—does not mean that I accept it. For limited tasks, frames or scripts perform acceptably. For broader tasks, where the issue of integrating background knowledge is important, i.e., where we need some "communication" between the frames, this does not happen because the strategy is wrong. Actually, human beings do not process signs within frames, but constitute newer and newer frames, in a process of continuous reconfiguration of both their knowledge and their strategy for processing new information. It is as though semiotic processes were part of this re-mapping of the mind and even "anticipate" instances of interpretation, pragmatic contexts. The anticipatory nature of our thinking—which will be discussed even further in the next section—corresponds to the way we as signs go through all the instances through which signs are constituted (pragmatic level), defined (semantically), and actually embodied (syntactically). The dominant model for almost the entire history of the sign concept—that of the human subject merely "re-acting" to signs—enforced decisions made when computers were conceived and built, programs written, and cognitive theories developed.

Experimental data confirming my hypothesis that our minds operate in anticipation of problems is becoming available almost at the time this study is being completed. The anticipatory function (regarding earthquakes, flood, long and harsh winters, etc.), which we attribute mainly to animals and plants (calling it instinct and explaining it in terms of closeness to "Mother Nature"), is strictly semiotic and determinant for the pragmatic level of the sign. In a text from summer 1873 published in the Writings of Charles S. Peirce (1886, Vol. III), we read that the significance of thought lies in its reference to the future, and understood why the editors decided to use this almost last sentence as the title. It summarizes a very important view in idea of the future work that Peirce will accomplish in establishing the Pragmatic Maxim.

5. The Inference Engine

We are multiprogrammed: genetically, socially, culturally, politically, economically, etc. We program genetic, social, cultural, political, and economic processes. In other words we are programmed to a certain extent, and we are programming creatures. Suggesting a new identifier for
is an example along the line of the final thesis introduced in "Pragmatics in the Semiotic Frame": The pragmatics of the sign follows the path of abduction (Nadin, 1987, p. 166). Indeed sign diversification (b, in the above formula) and a certain noticeable degradation of literacy (a) suggest the abduction new form of civilization (which I call the civilization of illiteracy, 1983, 1997), in which a different kind of pragmatics is possible. The semiotics of algorithmic activity is only part of the more general semiotic praxis of those constituting this civilization. As a mechanism for generating explanations about what we see around us, abduction—sometimes called hypothesis, or confused with deduction—is the semiotic operation per se. It represents a special type of inference characterized by its processuality. When Jean-François Liotard wrote that "the statutes of knowledge change when society enters the so-called post-industrial age and culture the post-modern," (1979, p. 12) he used, without naming it, the mechanism of abduction for explaining the new forms of semiotic activity as we encounter them in architecture, writing, philosophy, cuisine, etc.

The post-industrial can be semiotically identified through the sign representing it. The representamen (sign as sign) is the processing of information. Its object is the ensemble of human relations and of man-machine relations as mediated by signs, such as those constituting interfaces. The interpretant is the awareness (process in time) of the meta-level of knowledge and the meta-level. In order to semiotically define postmodern semiosis, we shall have to proceed in the same way. The representamen is the set of recycled signs from previous forms of art and culture (science included); the object, the separation of the logical mechanism of intelligence from perception, cognition and action. What is constant is the new critical approach of the situation, set of "quotes," "recycled" language, and collage. Information processing, becoming a dominant mode of human activity, restricts semioses, but also makes possible sign processes unprecedented in previous phases of human development, such as modeling, information processing (numerical and symbolic), and other complex semiotic activities. Our new tools are programs, and as such, a program called "word processing" is all the typewriters ever built in the world, plus some of the knowledge required programming. The semiotic competence represented by the rules which we use for organizing the text is provided through the program; so is spelling, so is the dictionary (synonyms, antonyms, homonyms, etc.).

The knowledge embodied in such a program comes from our own knowledge, stored and made available in an environment in which some other signs are used to make it what is called today "user-friendly." Although it is quite trivial in our days to show how certain tools can be modeled in programs and reproduced in their basic functions, it is less trivial to ask whether their usefulness and consciousness are reproducible in programs. How does our vision of it pose the question of semiotic evolution as attempts to "recycle" previous knowledge and to constitute a critical viewpoint that will become evident in the act of interpretation.

The constitutive function of the post-modern is one of search. Accordingly, the pragmatic level of the semioses defining the post-modern is represented by a search in all sorts of "trees," and by "pruning" strategies to reduce the search, so that the time necessary to run through the signs used for various explanations is brought to a supportable minimum. While the language I use here comes from the less specialized areas of computer science jargon, it actually applies to non-computer supported work as well, i.e., to any form of semiotically mediated activity. It shows how, in order to constitute ideas, we identify the need for expressive and communicative signs, which in turn influence the way we think about the phenomena approached. Indeed, for John Stuart Mill and his followers, "Hello" meant only what it would denote—its reference, which does not exist. After Wittgenstein, "Hello," as well as the entire computer jargon, means its use. By abduction, we can infer from what it might be to what it is with the help of the context of use. This is the pragmatic level of the signs used in the post-industrial. The meaning of each program is not the meaning of the sequence of statements following each other according to some syntactic rules or semantic conventions, but its use. By no accident, in my opinion, Peirce anticipated the logic machine. Kenneth L. Ketner undoubtedly leads the research in the Peircean heritage pertinent to computers (Notes, 20). In his most recent study (Peirce and Turing, 1986, to appear in Semiotica), Ketner suggests, a little too vaguely for my taste, "Peirce's logical algebras and that his logical graphs and Turing's 'machines' are all diagrams," (1986, p. 27). This thought can be understood only in the context of the larger concept of Peirce's thinking.

The first thing I found out were that all mathematical reasoning is diagrammatic and that all necessary reasoning is mathematical reasoning, no matter how simple it may be. By diagrammatic reasoning, I mean reasoning which constructs a diagram according to a precept expressed in general terms, performs experiments upon this diagram, notes their results, and expresses this in general terms.

Diagrams are algebras, matrices, arrays, mathematical notation, maps, plans, etc. and obviously Euclid's figures (favorites in his papers). Ketner goes so far as to state that "Indeed, 'diagram' for Peirce is roughly equivalent to a generalized notion of 'model.'" (Ketner, 1986, p. 19).

But what is especially relevant for the discussion I started in this section is the fact that both Turing and Peirce dealt with the boundary conditions of reasoning, of what is called today intelligence. Ketner is right in stating that Turing, by defining what is not computable "has established a negative mode version of Peirce's thesis that ... mathematical method is a living, creative, observational, experimental procedure," (Ketner, 1986, p. 31). This is the essence of the pragmatic method. In accordance with its spirit, as defined in the concept of sign process and the process character of the interpretant, we can say that it covers the so-called non-monotonic reasoning, which is the same as acknowledging that our understanding of the world changes over time, i.e., that we need to discard previous conclusions in the presence of new information.

The non-monotonicity of semiotics, defined by Peirce as a new name for logic, explains how, in our semiotic praxis, we continuously test our hypotheses, discard those inappropriate, and construct better ones. This is actually the core of the pragmatic method. Default logic prevents invalidation of inferences as they would occur if nothing changed in our semiotic condition. "Inferring is the sole act of cognitive mind," observed Max Fisch (1978, p. 36) in one of those remarkable analyses of Peircian texts which made him the authority in Peirce studies today. We are always in situations of incomplete knowledge about the world, but we dispose of semiotic mechanisms to make plausible inferences based either on rules ("unless there is knowledge to the contrary, assume that...") or on limited default reasoning, which boils down to saying that we continuously reduce, through semiotic procedures belonging to the pragmatic level of the sign, the infinite to the finite of the situation, set of events considered, and language used in a precise context. It is an implementation of Cantor's idea, despite the fact that Peirce noticed that Cantor's continuum is only a pseudocontinuum. The attempt to model human intelligence in the realm of the artificial can be seen as a knowledge semiosis. The more we succeed, the more we know about the subject. Inferences are plausible (show association with statistic models) or probable (probabilistic) or possible (possibilistic) inferences. In order to augment their predictive value, we have to introduce some weighing procedure. In view of the fact that the sign definition supports an analogy to fuzzy machines, I considered that fuzziness and the associated concept of possibility, which Zadeh introduced (1965) in conjunction with fuzzy sets, are better means than statistics or probability of "weighing" the relevance of terms constituting inferences. Inference networks, much closer to the way we actually interpret signs (we being those signs, as already explained) never before encountered, represent the pragmatic dimension in its multidimensionality, which sometimes become lost when we refer only to a tree search or a pruning procedure. Pruning itself is a probabilistic decision, if not determined possibilistically, which would come closer to the nature of the entities on which we operate when we actually perform such searches or pruning.
Understanding by intuition a "cognition not determined by a previous cognition," (CP 3.367), Peirce quite unequivocally stated that our
notion of ourselves is the result of an inference. Since it is not based on previous knowledge, this inference must result from something else.
Interpreting signs does not mean, as people thought for a long time, only to constitute those signs, but actually to embody them (instantiate) as
instances of the process called the interpretant. This self-constitution is one of our mind, i.e., of a semiotic configuration of this mind, in anticipation
of texts, images, music, mythological occurrences, political ceremonies, legal protocols, and symptoms (meteorological, medical, mechanical, etc.). It is never neutral in respect to the anticipated. It might represent desires, goals, expectations, biases, or anything else involved in the way
we bridge from present to future states. It can be confirmed, or it can lead to new configurations (corresponding to worst-case scenarios: "Be
prepared for..."). I assume (and this is indeed speculation) that when Heraclitus said "much learning does not teach understanding" (as quoted by
Diogenes), he might have had in mind that it is not by storing, retrieving, and matching knowledge that we understand things or events, but rather
by throwing various nets, in anticipation of questions, of situations, of decisions to be made. Yes, in this process "everything flows and nothing
abides" (quoted by Plato in Cartylus) and "that which is at variance with itself agrees with itself" (quoted by Hyppolitus and Plutarch, Notes, 21).
Leibniz, in New Essays on Understanding (1704) adds one more argument, "Nothing takes place at all once, and it is one of my greatest maxims, and one of
the most verified, that nature never makes leaps."

The preparatory phase that our mind maintains in its successive reconfigurations indeed eliminates leaps. As a dynamic functional reality, our
mind might maintain what W. Zenon Pylyshyn (Notes, 22) calls a transducer, "bridge from physical to symbolic." The transducer consists of,
among other components, a hard-wired relations component. In the process of continuous reconfiguration of our mind, the transducer keeps the
cognition of its current condition with physical reality, which, in turn, can be seen, from a pragmatic level of semiotic perspective, as phenomena
doing desynchronization and of progressive loss of the ability to anticipate and to reconfigure. A mapping process describes the
functioning of the transducer; patterns received by the transducer at both its ends (from the mind on one side and from the physical world on the
other) are checked against each other in view of their making sense or being disjoint. Human coherence and integrity, mentioned in the
introductory lines of the study, is accomplished at this stage.

Although we are approaching a different subject here, it is very important for understanding the relevance of the semiotic approach in
general, and the pragmatic level in particular. This subject is mind and computability. Saying that the mind has the nature of sign, and that
its functioning corresponds to the dynamic semiotic reconfigurations through which it identifies itself in various contexts, does not answer the
question of whether the mind can be duplicated in some computational model, a question which today represents the frontier in science as well as in
the humanities. At this stage of our knowledge about computation, we have accepted that not every aspect of our cognitive condition can be
modeled by machines. Turing restricted himself to the computable aspects. Recently Peter Kugel (1985/86, p. 141) suggested that we "look at parts of
human thinking that seem (to some of us) to involve more than computing and try to develop precise uncomputable models of them." For this
purpose, he applies the mathematical theory of uncomputability (or recursion theory). Indeed, there is a need to take the discussion out of the
emotional and culturally biased context in which we contemplate our substitution by machines and bring it to the realm of a theoretical controversy
in which we compare not minds but models of the mind.

Within this context, we might be able to understand that there is a major epistemological error that we keep committing. We talk about the
mind instead of minds; we deal with an "atom" and with the complex through which this atom is identified. Both Peirce and Ferdinand de Saussure
understood the social implications of a sign theory. The constitution and continuous reconfiguration of our mind is a process that takes place in
interaction with other minds. Mind does not exist as a singular entity. Its condition is plurality, and semiotic networking is the concrete form of this
plurality. Sometimes minds share a physical space and a common time; other times they become what they are in virtue of an interaction
independent of time or space, or constitute new forms of space and time relations of a conventional nature. Minds can be modeled, to a certain
degree of efficiency, as information processing devices. (I will not discuss here objections based on Gibson's ecological model.) But this modeling
lacks components which are not reducible to information (represented by numbers or by signs), especially encoding and decoding, which as we
know maintain the information. Codes are pragmatic devices which enable us to continuously redefine, clarify, and re-examine our ideas in one's
own context of reference, in a process not only as descriptions of such processes, or as labels, but as constitutive components.

Peirce cannot be associated with Morison—even for reasons for those who have not yet understood this will be provided in the text to
follow. Although he, too, has a system vision of semiotics, Ferdinand de Saussure missed the dynamics of the language, etc. in his reputed
distinction langue and parole.

5. See J. M. Lotman 1977, p. 1-18. This text deserves far more attention than it has received. Culture is defined here as a collective mind, and this
finding is then extended according to the hypothesis of the asymmetric brain resulting in the thesis that culture should also be seen as
asymmetrical.

6. F. Culler 1981, p. 25. He goes on to say: "If we are to understand our social and cultural world, we must think not of independent objects but
of symbolic structures, systems of relations which, by enabling objects and actions to have meaning, create a human universe." The books
mentioned are Cassirer's The Philosophy of Symbolic Forms, Alfred North Whitehead's Symbolism: Its Meanings and Effects, and Susanne K.
Langer's Philosophy in a New Key.

7. Cf. The Pursuit of Signs, p. 27. Culler was speaking about three distinct directions: the geology of signs, psychoanalysis, and economic
history as actually defined by Claude Levi-Strauss in his foundational work in anthropology.

8. When Lotman and Uspenskij write about a system of "prescriptions and prohibitions," the reader informed of or with experience in the
subject cannot notice the double code used. (Let us not fall prey to some Freudian semiological speculation characteristic of a different kind
of pragmatics, to be mentioned in due time within this section).

9. The Semiotic Sphere, edited by Thomas A. Sebeok and Jean Umiker-Sebeok 1985, gives a rather detailed account on the subject. A
less usual approach applies the mathematical theory of uncomputability (or recursion theory). Should also be mentioned here. Obviously, biases of all sorts can be noticed
in both, but at least the most recent account has a higher academic standard.

whereas human sciences considered Marxism to be 'non-scientific', or 'scientific in fields that are not our own.' The consequence of this was
that Marxists despised semiotics, while human scientists were afraid of it because of the unifying power of a generalized science of all
systems of signs." (Preface, p. x.)

Notes
would go far beyond the scope of this study. The semiotic implications of such decisions cannot go unnoticed. In fact, we process signs of
for building parallel architecture machines when it had to deal with the relations between multiprocessors and the available memory, a

Abduction: “we come nearer to knowing that justice can be taught, on account of the credibility of justice being a science,” (p. 108). The extreme at which abduction disappears is when instead of coming to something, we  it, i.e., when we deal
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Boethius and and even  by the Schoolmen.” He goes on to give Aristotle’s definition and exemplifies it with “what can be
of , a word employed by Julius Pacius, as the translation of ( lib. 2, cap. 25), which had been rendered by
Specimen of a Dictionary of the Terms of Logic and Allied Sciences: A to ABS” (p. 105-122), Peirce covers abduction: “This is the English form
workshops focused on visual communication (graphic design, advertisement, photography, typography), architecture, product design, and in
recent years on computer graphics and artificial intelligence.

Specimen of a Dictionary of the Terms of Logic and Allied Sciences: A to ABS* (p. 105-122), Peirce covers abduction: “This is the English form
of abolutio, a word employed by Julius Pacius, as the translation of (Prior Analytics, lib. 2, cap. 25), which had been rendered deductio by
Boethius and reductio and even inductio by the Schoolmen.” He goes on to give Aristotle’s definition and exemplifies it with "what can be
taught," "science" and "justice." By abduction: "we come nearer to knowing that justice can be taught, on account of the credibility of justice
being a science," (p. 108). The extreme at which abduction disappears is when instead of coming to something, we  it, i.e., when we deal
with knowledge.


All these here in English translated quotations, cf. Heraklitus (ed. by Wheelwright 1964).

Cf. W.Z. Pylyshyn 1984, p. 147. The term "transducer" was adopted by the computer manufacturing community in search of better strategies
for building parallel architecture machines when it had to deal with the relations between multiprocessors and the available memory, a
distributional issue. As a matter of fact, a special language, named Occam, was devised for the same purpose. A more detailed account
would go far beyond the scope of this study. The semiotic implications of such decisions cannot go unnoticed. In fact, we process signs of
various origins and various qualities in parallel processing mode all the time.

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